edge of the oyster is brought against the inner edge of the lip with considerable pressure and then drawn inward and toward the canal. A small piece is chipped from the edge of the oyster and the process repeated until a gap is made large enough to to admit the radula, which then tears out the flesh. This method of getting at the animal explains not only the roughened and chipped condition of the lip of the Busycon, but also the chipped oyster and quahaug shells. Occasionally I have found a live quahaug with its edge much chipped but still intact, so the whelk does not always succeed. Usually, however, it encounters but little difficulty.

---

## DESCRIPTIONS OF NEW SPECIES FROM THE CRETACEOUS AND TERTIARY OF THE TESLA, PLEASANTON, SAN JOSE, AND MT. HAMILTON QUADRANGLES, CALIFORNIA.

BY E. B. HALL AND A. W. AMBROSE.

### INTRODUCTION.

During the paleontological work at Stanford University, for a folio covering the Tesla, Pleasanton, San Jose and Mt. Hamilton Quadrangles, several new forms were found. In order that the names of these might be established, the writers decided to publish the descriptions of the same. The writers' thanks are due Dr. James Perrin Smith for his assistance to the writers in this work.

### Horsetown—Middle Cretaceous.

Pecten clarkensis n. s. Hall and Ambrose.

*Description.* Shell small, two specimens found averaging 17 mm. in altitude, little higher than long, compressed, thin, subcircular, equivalve and equilateral; ears equal, moderately small, base regularly rounded, margins smooth. Surface marked by 20 or 21 radiating nearly equal ribs, being two or three times the width of interspaces that terminate abruptly a little way from margin, also by obscure lines of growth.

*Dimensions.* Alt., 16 mm.; latitude, 16 mm.; longitude, 18 mm.; hinge line (restored and approximate) 9 mm.; diameter, 11 mm.

*Notes.* Characterized by definite number and character of ribs, and easily distinguished from *P. operculiformis*, *P. californicus*, *P. complexcosta*, and *P. interradiatus*. Named in honor of W. O. Clark.

*Type.* Museum, Stanford University, Calif.

*Locality.* Found by W. O. Clark on the San Jose Quadrangle, two and a half miles Northeast of Milpitos, just at beginning of foothills and a little north of serpentine outcrop.

*Horizon.* Horsetown, middle Cretaceous.

Avicula gregoryi, n. s. Hall and Ambrose.

*Description.* Shell oblique, subcompressed; ears very unequal; beaks moderate, anterior; cardinal line straight; anterior ear short and angular with small byssal notch; posterior ear broad; anterior margin regularly rounded from near umbo to base, posterior margin straight and sharply rounded to base, basal margin forms an excentric curve, most produced behind. Ears gradually round into body of shell. Surface marked by numerous faint, but distinct, radiating ribs.

*Dimensions.* Altitude 7 mm.; longitude 9 mm.; hinge line 5 mm.; diameter.

*Notes.* Distinguished from *A. pellucida* by ribs, byssal notch and lack of acuminate posterior ear. Named in honor of A. E. Gregory, Stanford University, Calif.

*Type.* Museum, Stanford University, Calif.

*Locality.* One and one-half miles S. 10 W. of Carnegie, Tesla Quadrangle.

*Horizon.* Horsetown, middle Cretaceous.

Sonneratia rogersi, n. s. Hall and Ambrose.

*Description.* Shell small, not often above a diameter of 4.5 mm.; discoidal, laterally compressed and flattened; umbilicus not large, about one-quarter total diameter, funnel form due to sloping sides and gradual increasing thickness of shell; sides converge gently toward periphery; ventral surface subquadrate; surface ornamented with about sixty transverse flexuous ribs which usually cross the ventral surface and terminate in about one-quarter as many distinct tubercules upon the shoulder of

the umbilicus. The ribs show a tendency to bifurcate from these ridge-like tubercules, and become less distinct on the sides of the shell, curving gently backward, and becoming very distinct and wider near the outer margin where they turn decidedly forward. The suture line is simple, consisting of a few broadly rounded saddles and wide lobes having very short branches. Saddles little indented, and are bifid with rounded denticles and incisions. Lobes unequally tripartite.

*Notes.* This form easily distinguished from *S. stantoni*, as it has nearly twice as many ribs, a lack of fine lines, striations on ribs and interspaces, and a greater size. Named in honor of Professor A. F. Rogers, Stanford University, Calif.

*Type.* Museum, Stanford University, Calif.

*Locality.* Three-quarters of a mile South of Carnegie, Corral Hollow, Tesla Quadrangle.

*Horizon.* Horsetown, middle Cretaceous.

CHICO—UPPER CRETACEOUS.

ATAPHRUS PEMBERTONI, n. s. Hall and Ambrose.

*Description.* Shell medium, thick, rather flattened, spire low; whorls four, rounded, enlarging rapidly anteriorly, and revolving a little obliquely; whole body being about twice as large as penultimate. Aperture oblique, subcircular, columellar lip thick and rather straight. Surface smooth, marked only by occasional very faint lines of growth; umbilical region covered by a smooth callus, which merges insensibly into general surface.

*Dimensions.* Alt., 12 mm.; lat., 18 mm.; alt. of body whorl, 7 mm.; alt. of aperture, 9 mm.

*Notes.* Distinguished from *A. crassa* by its size, higher spire, and non-rounding of columellar lip. Named in honor of J. R. Pemberton.

*Type.* Museum, Stanford University, California.

*Locality.* Jordan Ranch, Arroyo del Valle, Tesla Quadrangle, Alameda County, California.

*Horizon.* Lower Chico, upper Cretaceous.

CERITHIUM BRANNERI, n. s. Hall and Ambrose.

*Description.* Shell elongate, slender; whorls numerous, prob-

ably eight, two apical whorls being lost, rounded on sides; suture linear, impressed. Surface marked by numerous, slightly curved longitudinal ribs, about twenty-six to a volution; these are more prominent near upper suture of the whorl and become very indistinct at the lower suture; very fine striae cover both ribs and interspaces, running parallel with ribs; ribs and interspaces crossed alike by numerous shapely elevated revolving threads, running parallel to suture. These produce a small node at each crossing of the longitudinal rib one-quarter of the way down on the lowest whorl, one-third down on the second, one-half down on the third, and the entire way down on the remaining whorls. Aperture, sub-circular; inner margin somewhat thickened and curved.

*Dimensions* (less several apical whorls). Alt., 16 mm.; lat., 7 mm.; alt. of body whorl, 13 mm.; alt. of aperture, 4½ mm.

*Notes.* Named in honor of Dr. John C. Branner.

*Type.* Museum, Stanford University, California.

*Locality.* One mile north, 20° west of Tesla and Corral Hollow, Tesla Quadrangle.

*Horizon.* Middle Chico, upper Cretaceous.

(*To be continued*)

## NOTES.

Fossil Chitons. In working over some fossil shells from the Pleistocene strata of Deadman's Island, San Pedro, California, I find that I have three species which are not listed by Arnold in his "Paleontology and Stratigraphy of the Pliocene and Pleistocene of San Pedro."

*Katherina tunicata* Sby. One perfect anterior valve.

*Ischnochiton conspicuus* Cpr. One perfect posterior valve.

*Mopalia hindsii* (Sby.) Rve. One central valve in good condition.

These were identified by comparing with recent specimens. *Ischnochiton conspicuus* is found living in this vicinity and has been reported fossil from the Pleistocene at Signal Hill, Long Beach, by Mr. T. S. Oldroyd. (Nautilus, vol. 28, page 80.)